



**News (cont. from p. 977)**

ganic compound in crude oils and oil shales, but until this recent study, existence of the compound has remained unconfirmed.

Trebits' scheme detailed the formation of the porphyrin from chlorophyll. The steps of porphyrin formation could characterize the biological origin of petroleum, but the very crucial piece of evidence has been lacking.

The apparent difficulties of extracting an adequate single crystal without suffering chemical decomposition were overcome in a multistep process. The extraction was accomplished with a sample of oil shale from the Julia Creek Deposit in North Queensland, Australia. X-ray diffraction analysis yielded a monoclinic cell ( $P2_1$ ) with  $a = 12.912 \pm (3)$ ,  $b = 14.151 \pm (4)$ , and  $c = 18.404 \pm (8)$ ,  $\beta = 70.54 \pm (2)$ . The structure refinement completed with a residual of 0.077. The crystals were found to have the vanadyl  $Cu$  DPEP structure, which was proposed by Trebits in 1984.

According to the CSIRO group: "The result is important because it represents the first complete identification of a petroporphyrin unlikely to have been chemically altered by the extraction procedure. More importantly, however, the determination of this structure confirms, for the first time, the long-held belief that petroporphyrins are derived from chlorophyll." The results substantiate Trebits' hypothesis, which is accepted as the foundation for organic geochemistry.—PMB

**Artificial Coal**

The geology and geochemistry of coal are receiving increased attention in federal government laboratories. Coal may be burned at increasing rates for centuries to come, and thus its properties must be better known. A new approach to coal research was reported recently by investigators at the Argonne National Laboratory (*Chemical and Engineering News*, November 21, 1983). A group from Argonne's Division of Chemistry has recently synthesized coal from natural materials. The results of this study may provide insight into the nature of the highly complex organic structures that are found in coal. Clearly, the goals of the Argonne program to characterize coal chemically and to document the geological processes of its formation are closer to being realized than ever before.

There may be numerous geologic processes involved in the formation of coal deposits. Plant material is thought to undergo biogenic alteration in nature before it is metamorphosed into coal, but the new Argonne results may dispute this. In the artificial coalification experiments, lignin was converted directly to lignite by a clay-catalyzed process. The geological analogue would be the slight alteration of wood, with the loss of hydrocarbons, followed by the formation of coal macromolecules at relatively low temperatures (150–200°). Natural clays could also act to catalyze the reaction.

The study is only beginning, but the early findings have been intriguing samples of what may be expected. The suggestion is that lignins and other similar materials may survive sedimentary diagenetic processes; indeed, they may be relatively pure products. If so, they could be converted directly to coal molecules in relatively short time periods (months) by naturally catalyzed reactions.—PMB

**Hubble Space Telescope**

The Space Telescope, scheduled for launch aboard the Space Shuttle in 1986, has been renamed the Edwin P. Hubble Space Telescope, the National Aeronautics and Space Administration (NASA) announced. The orbiting optical astronomical observatory will carry a 2.4-m mirror and five scientific instruments that will be able to look into space 7 times farther than any ground-based observatory; NASA expect the resolution of the resulting images to be 10–20 times better than images from ground-based instruments.

Hubble probably is best known for his discovery, with colleague Milton Humason, that the universe is expanding. Hubble confirmed that the faint, spiral nebulae viewed through the Mount Wilson Observatory Hooker Telescope were distant systems receding from us at velocities proportional to their distances. Hubble was a staff member at Carnegie Institution's Mount Wilson Observatory near Pasadena, Calif., from 1919 until his death in 1953.

**Geophysicists**

Charles A. Barth, director of the Laboratory for Atmospheric and Space Physics at the University of Colorado, Boulder, recently was awarded the National Aeronautics and Space Administration's medal for distinguished public service. Barth was cited for his "outstanding leadership and contributions in proposing and establishing the Solar Mesosphere Explorer (SME) project" as well as his personal dedication that has helped make the SME a "highly successful scientific mission."

**Recent Ph.D.'s**

*For periodically lists information on recently accepted doctoral dissertations in the disciplines of geophysics. Faculty members are invited to submit the following information for publication, on institution letterhead, above the signature of the faculty advisor or department chairman:*

- (1) the dissertation title
- (2) author's name
- (3) name of the degree-granting department and institution
- (4) month and year degree was awarded.

If possible include the current address and telephone number of the degree recipient (this information will not be published).

*Rock Magnetism and Paleomagnetism of Alluvial Fluvial Sediments in Northern Pakistan, Lisa Tauxe, Dept. of Geological Sciences, Columbia Univ., January 1983.*

*Seismic Hazard Evaluation in Intertidal and Inland Environments, Stuart P. Nishimura, Dept. of Geological Sciences, Columbia Univ., January 1983.*

*Seismic Velocities and Attenuation in a Heated Underground Granitic Repository, Bjorn N. P. Paulsson, Dept. of Materials Science and Mineral Engineering, Engineering Geoscience, Univ. of California, Berkeley, January 1983.*

*Geochemistry of Haleakala Volcano, East Maui, Hawaii and Implications for the Evolution of Hawaiian Volcanoes, Chu-Yung Chen, Dept. of Earth, Atmo-spheric and Planetary Sciences, MIT, February 1983.*

*High Temperature Deformation of Hot-Pressed Polycrystalline Orthoammonite, A. Delight, Dept. of Material Science, Univ. of Southern California, February 1983.*

*Extrapolation of Ions by Oblique Double Layers, Marian Elizabeth Greenup, Physic Dept., Univ. of California, San Diego, April 1983.*

*Geologically-Developed Probability Seismic Risk Analysis, Hui-Yuan Liang, Dept. of Geological Engineering, School of Mines & Metallurgy, Univ. of Missouri-Rolla, May 1983.*

*High Latitude Field Currents, Janice L. Karty, Dept. of Space Physics and Astronomy, Rice Univ., May 1983.*

*Reliability, Resilience and Vulnerability in River Operation, Wai-Soo Moy, Dept. of Geography and Environmental Engineering, Johns Hopkins Univ., May 1983.*

*Seismotectonics of British Columbia, Garry C. Rogers, Dept. of Geophysics and Astronomy, Univ. of British Columbia, May 1983.*

*Theoretical and Field Studies of Fluid Flow in Fractured Rocks, Paul Anthony Hsieh, Dept. of Hydrology and Water Resources, Univ. of Arizona, May 1983.*

*The Thermomechanical Properties of the Continental Lithosphere, Gary D. Karner, Dept. of Geological Sciences, Columbia Univ., May 1983.*

*Geochemistry of Boninites and Other Low  $TiO_2$  Island Arc Volcanic Rocks, Rosemary L. Hickley, Dept. of Earth, Atmospheric and Planetary Sciences, MIT, June 1983.*

*Geochemistry of the Preston Gabro of Southeastern Connecticut, Alfred T. Walker III, Dept. of Geological Sciences, Lehigh Univ., June 1983.*

*Laboratory and Field Investigations of the Processes Controlling Gas Exchange Across the Air-Water Interface, Blayne A. Hartman, Dept. of Geological Sciences, Univ. of Southern California, June 1983.*

*Petrochemical Evolution of High Cascade Volcanic Rocks in the Three Sisters Region, Oregon, Scott S. Hughes, Dept. of Geology, Oregon State Univ., June 1983.*

*Reservoir Operating Rules Generated by Deterministic and Stochastic Optimization, Mohammad Karamouzi, School of Civil Engineering, Purdue Univ., June 1983.*

*Three-Dimensional Magnetotelluric Interpretation, Philip E. Wannamaker, Geology and Geophysics Dept., Univ. of Utah, June 1983.*

*Wave and Particle Observations Associated with the Beam Plasma Discharge in a Space Simulation Chamber, William F. Denig, Dept. of Physics, Utah State Univ., June 1983.*

*Approximate Analytical Solutions for Modeling Subsurface Flow, Andrzej Banikiewicz, Dept. of Civil Engineering, Virginia Polytechnic Institute and State Univ., August 1983.*

*Diagnosis and Reservoir Qualities of the Jurassic Navajo (Nugget) Sandstone in Utah and Southwestern Wyoming, Kadir Uygur, Geology and Geophysics Dept., Univ. of Utah, August 1983.*

*Propagation of Weakly-Nonlinear Surface Water Waves in Regions with Varying Depth and Current, James T. Kirby, Jr., Dept. of Civil Engineering, Univ. of Delaware, August 1983.*

*Unsteady Flow Simulation of Rivers with an Ice Cover, Poojitha N. D. D. Yapa, Dept. of Civil and Environmental Engineering, Clarkson College, August 1983.*

*Crustal Structure and Seismicity of the Washington Continental Margin, J. John Taber, Geophysics Program, Univ. of Washington, September 1983.*

*Morning Twilight Observations of the Zodical Light and Terrestrial Airglow, Richard P. Ceibula, Johns Hopkins Univ., Dept. of Physics, September 1983.*

*Hydrographic Variability in the Western North Atlantic Ocean from the POLYMODE Local Dynamics Experiment, Eric J. Lindstrom,*

School of Oceanography, Univ. of Washington, October 1983.

*Magnetostratigraphy of Neogene Quaternary Siliciclast Group Sediments of the Trans-Indus Salt Range, Northwestern Pakistan, Mohammed Javed Khan, Dept. of Geological Sciences, Columbia Univ., October 1983.*

*Short-term Forecasting of Municipal Water Use, Roland Steiner, Dept. of Geography and Environmental Engineering, Johns Hopkins Univ., October 1983.*

*Analysis and Interpretation of Magnetic Anomalies Observed in North-Central California, Joanne L. Hippunen, Dept. of Geophysics, College of Oceanography, Oregon State Univ., November 1983.*

*The Interaction of Short Gravity Waves with the Gulf Stream, Show-Ming Huang, Dept. of Marine, Earth, and Atmospheric Sciences, North Carolina State Univ., December 1983.*

**Books****Deposition of Atmospheric Pollutants**

H. W. Georgii and J. Pankrahl (Eds.), D. Reidel, Boston, ix + 217 pp., 1982, \$37.

Reviewed by L. M. Malet

*Deposition of Atmospheric Pollutants*, containing the proceedings of a colloquium held at Oberursel/Taunus, FRG, November 9–11, 1981, is divided into three main parts: dry deposition; wet deposition; and deposition on plants and vegetation.

The 20 articles in the volume permit a fair survey of present-day knowledge and will be a useful tool to all working on the topic. Pollution by deposition of either the dry or wet sort is very insidious; its importance only appears in the long range, when its effects are or are almost irreversible. That is why concern was so long in emerging from decision makers.

The measurements of wet deposition emphasize that acid precipitation with increased sulfate and nitrate concentrations occur in heavily polluted areas as well as in less polluted areas. In less polluted areas outside the emission areas the concentrations of the acid substances in rain are reduced by a factor of 2 or 3 only. Furthermore, the wet deposition pattern is mainly determined by the precipitation pattern. This is of main importance for less polluted mountain regions which receive high wet deposition of acid substances.

Together, the articles show what should be done all over the world, even in regions which are not yet concerned or are not yet aware that they are affected by pollution from wet and dry deposition.

The third chapter deals with deposition on plants and vegetation. Out of four contributions, three are devoted to the deposition of the atmospheric aerosol above and beneath a beech and spruce forest canopy and its ecological effects owing to the serious changes in soil chemistry that are believed to be triggered by acid rain.

The result is a serious degradation of beech and spruce forests which act as acid concentrators. Acid entering the forest ground is 2 (beech) to 4 (spruce) times the acid in the rain entering the forest canopy because foliage and bark capture and oxidize SO<sub>2</sub> present in the atmosphere in very low concentrations. When it rains, this acidity is washed out, added to the acidity of the raindrops, and stored in the ground where aluminum is released with disastrous effects on the development of fine roots.

The fourth article in chapter 3 deals with the effects of atmospheric pollutants on materials and on research needs. The author (R. W. Lanius, TNO, The Netherlands) underlines the priority which should be given to studies of the corrosion of different kinds of materials due to SO<sub>2</sub> and NO<sub>x</sub> and their secondary products. In wet deposition, chloride, hydrogen, and sulfate ions are important.

All articles are followed by a good, up-to-date bibliography.

When comparing results obtained using one or the other of the three methods, it is not astonishing at all that differences of one order of magnitude and even more are found. The field of research in this domain is still quite open; it is evident that systematic, long-term experiments should be made over a variety of terrains and under a variety of meteorological conditions before we come to more realistic conclusions.

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**POSITIONS AVAILABLE**

Geophysicist or Tectonophysicist/University of Kansas. KU seeks applications for a tenure-track faculty position in geophysics. Candidates should have research interests in tectonics. The successful applicant will be expected to teach undergraduate and graduate geophysics courses, advise a graduate research program, advise students, supervise graduate student theses and dissertations, and provide service through administrative and professional activities. A Ph.D. in geophysics with specialization in tectonophysics is required although applicants who will complete their Ph.D. with the year of employment at KU will be considered. The position is at the assistant professor level with a salary commensurate with qualifications. The starting date is August 16, 1984 and the application deadline is February 1, 1984. Send vita, transcripts, a brief statement of research interests and courses of research, three letters of reference, and copies of publications to Dr. G. H. Girty, Department of Geology, University of Kansas, Lawrence, KS 66045. The advertised position is contingent on continued funding. For additional information contact G. H. Girty or phone (913) 864-4974.

KU is an affirmative-action, equal-opportunity employer. Applications are sought from all qualified people regardless of race, religion, color, sex, disability, veteran status, national origin, age, or ancestry.

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Faculty Research Positions/University of Maryland Institute for Physical Science and Technology.

The University of Maryland Institute for Physical Science and Technology invites applications for open professorial positions at all ranks in several areas including atomic, molecular spectroscopy and structure, UV-VIS physics, laser plasmas, laser-matter interactions, laser light scattering, non-linear optics of gases, condensed matter physics, statistical physics, atmospheric optics and spectroscopy, solar plasma, magnetohydrodynamics, electron microscopy, applied mathematics, numerical analysis, dynamical systems and chaos, and the history of science and technology. It is anticipated that one or more faculty appointments, either part-time or full-time, will be made in the coming year in the above or closely related fields. Please apply to Prof. R. B. Palmer, Director, IPST, University of Maryland, College Park, MD 20742.

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Geophysicist or Hydrogeologist/NUS Corporation.

With responsible experience in the application of geophysical methods to hydrogeological problems, especially in fractured rock environments, the applicant should be competent to develop an active research program in a teaching/university setting, and to contribute to geotechnical engineering and environmental geology. The PhD is required. Applicants with course work, research experience and interest in the field application of geophysical principles are especially encouraged.

Send letter of application outlining your professional goals, transcripts, resume, copies of publications, and three letters of reference to Dr. David M. Likens, Department of Geology and Geophysics, Woods Hall, University of Wisconsin, Madison, WI 53706.

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Microprobe Technician/South Dakota School of Mines and Technology.

Applications are invited for a position as microprobe technician for the Institute for the Study of Mineral Deposits (ISM) at the South Dakota School of Mines and Technology, Rapid City, South Dakota. PhD degree in the general areas of mineralogy, petrology, geochemistry, and/or mineral exploration is required. The successful applicant will be responsible for the day-to-day operation of the instrument including maintenance and repair of hardware, development of software, routine analysis of minerals, and assistance to students. A background in electronics is required. Salary commensurate with experience and qualifications.

A letter of application, vita, and three letters of recommendation to J. J. Papke, Director, Institute for the Study of Mineral Deposits, South Dakota School of Mines and Technology, Rapid City, South Dakota 57701–9993. Closing date, March 31, 1984. For additional information, call (605) 394-6182.

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Naval Postgraduate School, Faculty Positions/Meteorology.

The Department of Meteorology, Naval Postgraduate School, invites applications for a tenure-track and a non-tenure track position at the Assistant or Associate Professor level. The positions are for persons whose teaching and research interests are in the areas of remote sensing, atmospheric and oceanic meteorology. The successful applicants will teach graduate and undergraduate courses and will be expected to develop an active research program that complements his/her teaching. Rank and salary will be commensurate with the experience and qualifications of the successful applicants. Send a resume, names and addresses of references, and statements of research interests, indicating availability for a non-tenured position, by 91 Dec 1983 to: Professor R. J. Renard, Chairman, Department of Meteorology, Naval Postgraduate School, Monterey, California 93943. (Area code 408-646-2516/7).

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**DIRECTOR****Oklahoma State University Water Research Center****Responsibilities include:**

- Implement and coordinate programs of the Water Research Center.
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- A Ph.D. degree with several years' experience in water resources is highly desirable.
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- Research administration and graduate level teaching experience are desired.

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**Academic Rank: Commensurate with academic training and professional experience.** Although the director's position is not a tenure-track appointment, there is the possibility that the director can be appointed to a tenure-track position within an appropriate academic department. This would require approval of the department and appropriate dean.

**Applications:** Applications will be received until March 1, 1984. Send letter of application, resume, transcripts and a list of three (3) references to:

**Dr. W. A. Sibley**  
Oklahoma State University  
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Stillwater, Oklahoma 74078

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**Meteorologist/Department of Commerce, National Oceanic and Atmospheric Administration (NOAA)**  
The Office of Climatic and Atmospheric Research, Office of Oceanic and Atmospheric Research, NOAA, announces a vacancy for the position of Meteorologist, GM-1340-1914, Rockville, Maryland. Vacancy close January 12, 1984. Incumbent will plan, coordinate and implement research program from mesoscale to climate applications, with emphasis on satellite data collection, data management and climate research activities. Serves as focal point within NOAA for data management activities associated with and evaluate research proposals for such programs as First GARP Global Experiment (FGGE) and Tropical Ocean and Global Atmosphere (TOGA) Program. Allocates funds for research contracts and grants. Persons interested in this position are invited to request a copy of Vacant Announce by writing to: Attn: V. Peters, AT/PER/11 or calling (301) 435-8373. Applications should be submitted on Standard Form 171. Department of Commerce is an equal opportunity employer.

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**Hydrography.** Ph.D. or some experience preferred. Positions involve both analytical modeling and analysis of small-scale hydrodynamic processes in the ocean. Experience with internal wave, finestructure or microstructure is desirable.

Submit resume and salary requirements to: Fern Marks, Manager of Administration, Dynamics Technology, Inc., 22939 Hawthorne Blvd., Torrance, CA 90509. Equal Opportunity Employer M/F—U.S. citizenship required.

**Geophysicist-Tectonophysicist/University of Wyoming.** Applications are invited for a tenure-track position at the Assistant Professor level in the Department of Geology and Geophysics. Candidates should have teaching and research interests in such areas as tectonophysics, thermal modeling and/or plate tectonics. The successful applicant will join an established Ph.D. level geophysics program. Duties will include teaching undergraduate and graduate level geophysics courses and establishing a vigorous research program. Excellent opportunities exist for cooperation with mathematics; the Mathematics Department includes a strong numerical methods group with interests in geophysics. Send resume, transcripts and three letters of recommendation by January 15, 1984 to: Prof. R. N. Shire, Dept. of Geology/Geophysics, PO Box 3009, University of Wyoming, Laramie, WY 82071.

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**McMaster University/Department of Geology-Geophysics.** Applications are invited for a tenure-track position in Geophysics. The department has established strengths in geochemistry (including isotopic studies), sedimentology and paleontology, and is seeking to develop into areas of solid earth geophysics research, including geological research programs. Teaching duties will include a course in applied geophysics for geology students and participation in a joint Geology/Physics program.

The appointment should be made before September 1984 and will probably be at the Assistant Professor level. In accordance with Canadian immigration regulations, priority will be given to Canadian citizens and permanent residents of Canada. Those interested should submit a curriculum vitae and the names of three references to:

**Dr. M. R. Kirk, Chairman, Appointments Committee, Department of Geology, McMaster University, Hamilton, Ontario, Canada, L8S 4M1.**

**Global Weather Dynamics, Inc./Computer Specialist.** Location: National Meteorological and Environmental Center (NMEC) within the Meteorological and Environmental Protection Administration (MEPA), Jeddah, Kingdom of Saudi Arabia.

Actual Duties: Qualifications: Master of Science preferred with major in Meteorology or Computer Science. Appropriate types and duration of experience may be acceptable in lieu of academic qualifications.

Experience: Extensive computer experience including responsibility for data base design, development and implementation together with experience in the use of computers in meteorology. Data Corporation (CDC) computer system. Experience in writing requirements documents and demonstrated advanced COBOL and FORTRAN programming skills are essential. Experience in file-handling applications having professional experience with CDC operating systems and file management. Experience in Meteorology including data base construction and familiarity with archiving procedures in a major interest area of an environmental center desirable. Evidence of a broad interest in the environmental sciences would be an additional advantage.

Duties: The appointee will report to the Assistant Director of Meteorology, MEPA. He will have primary responsibility for the design, development and implementation of the digital data base of environmental data base. He will be responsible for training a Saudi counterpart in data base maintenance. He will also be required to liaise effectively with the Data Base Meteorologist, Quality Control Meteorologist and Environmental Specialist in the course of carrying out the Data Base Development Program and with the computer center staff in day-to-day operations.

Send resume to:

**Global Weather Dynamics, Inc.**  
1000 North Roxbury Drive  
Monterey, California 93940  
Attention: Louise Gates  
Telephone: (408) 649-5300

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**Geophysicist, Tectonophysicist/Georgia Tech.** The School of Geophysical Sciences at Georgia Tech invites applications for a faculty appointment in Earth Sciences. Applicants must have an outstanding research potential demonstrated by several years of postdoctoral experience or a well-established research record, and experience in securing research funding. Although no field of specialization is excluded, preference will be given to candidates with a background in geophysics/tectonophysics.

The School of Geophysical Sciences has an expanding and active research program in many areas of Earth and Atmospheric Sciences. The School has 23 full-time faculty members and over 50 graduate students.

Applications including resumes, phone numbers, and the names and addresses of at least three referees should be submitted to Jean-Claude Mareschal, Chairman, Geophysics Search Committee, School of Geophysical Sciences, Georgia Institute of Technology, Atlanta, GA 30332.

The Georgia Institute of Technology is a unit of the university system of the State of Georgia.

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**AGU Congressional Science Fellowship.** Individuals who are AGU members and U.S. residents are invited to apply for a 1-year assignment on the staff of a congressional committee or a House or Senate member. It is open to a wide range of scientific issues affecting public policy.

Applicants should have a strong background in science; be articulate, literate, and flexible and be able to work well with people from diverse professional backgrounds.

A public policy background is not required, although such experience and/or a demonstrable commitment to public service to the solution of public problems is desirable.

The fellowship carries with it a stipend of up to \$28,000 plus travel allowances.

How to apply: Applicants should submit a letter of intent, a current vita, and three letters of recommendation. The letter of intent should include a statement of why the fellowship is desired, how you qualify for it, what issues need to be addressed, your interests, your role you envision in a congressional office, a fellow, and what outcome you hope for in relation to career goals. The individuals from whom you request letters of recommendation should discuss your professional competence and other aspects of your background that make you particularly qualified to serve as a Congressional Science Fellow.

Send your application to: Department MP, Congressional Science Fellowship, American Geophysical Union, 2000 Florida Avenue, N.W., Washington, DC 20008. Application deadline: March 31, 1984.

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**Short Courses****Field Methods in Contaminant Hydrogeology April 30 to May 4, 1984**

This course acquaints the practising hydrogeologist or engineer with current field investigation techniques for the study of groundwater contamination. The focus is on design and implementation of field programmes for the monitoring of parameters needed in water quality evaluations and environmental impact predictions. Monitoring problems and techniques specific to organic or toxic inorganic contaminants are considered. The course includes extensive field demonstrations conducted at an abandoned landfill where numerous techniques have been evaluated during the monitoring of a large plume of contaminated groundwater. The course is now in its fifth year.

For more information please contact Heather Sokoloski or Marilyn Biggoudi Groundwater Research Institute, University of Waterloo, Waterloo, Ontario, Canada N2L 3G1 Telephone (519) 885-1211, Ext. 2892

**Groundwater Research Institute University of Waterloo****Environmental Isotopes in Hydrogeology**

May 9 to 11, 1984

This course presents the state of the art in isotope hydrogeology and acquaints the practising hydrogeologist or engineer with the state of the art in contaminant hydrogeology. Topics covered include basic physical and chemical principles, the processes that control the behaviour of organic and inorganic contaminants in groundwater, and investigative as well as analytical tools in the areas of mathematical modelling, laboratory techniques, and field techniques, including recently-developed approaches. Various types of groundwater contamination problems are illustrated through case histories selected from research and consulting projects. Emphasis is on bridging the gaps between theory, the laboratory, and the field, and between research and practice.

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**University of Washington/Paleontology/Paleobiology Geochronology.** The Department of Geological Sciences anticipates two positions for postdoctoral research appointments at the University of Washington at any level in August 1984. In exceptional cases, a term or tenured appointment at the associate professor or professor level will be considered. Preference for postdoctoral work will be given to an experimentalist in intermediate energy ion beam and extended atmospheres and ionospheres of the giant planets and their satellites, the interstellar medium, and the terrestrial atmosphere of Venus. Applications should have a solid background in theory and data analysis. Physicists and chemists are encouraged to apply. Curriculum Vitae, bibliography and three letters of reference should be sent to Dr. A. L. Brightwell, Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ 85721.

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**University of Georgia/12-month tenure-track faculty appointment in the School of Forest Resources.** Qualifications: Ph.D. in hydrology or forest hydrology with one or more years of postdoctoral research. Background should include forest resource management and quantitative sciences. Responsibilities: Teach undergraduate and graduate level courses in forest hydrology and watershed management. Develop a research program in an appropriate area of forest hydrology. Rank: Assistant or Associate Professor, commensurate with qualifications. Salary: Commensurate with qualifications and experience. Application deadline: January 1, 1984. Applications: All applications must be postmarked no later than 1 February 1984. Submit resume, transcripts, and names of at least three references to:

**Klaus Steinbeck, Chairman**  
Hydrologist Search Committee  
School of Forest Resources  
University of Georgia  
Athens, GA 30602  
Telephone 404-542-1376

The University of Georgia is an Equal Opportunity/Affirmative Action Institution.

**University of Washington/Faculty Position in Geophysics.** The Geophysics Program at the University of Washington invites applications for a tenure-track position. The successful applicant will be expected to teach courses at the senior and graduate student level and to establish innovative, forward-looking research programs. Applicants with a Ph.D. and evidence of outstanding potential in basic research in any subfield of solid-earth geophysics will be considered. However, applicants with primary interest in solving global problems or in studying the physical properties of the crust and mantle and core will receive preference. Curriculum Vitae and four letters of reference should be sent prior to 31 January 1984 to:

**Professor Ronald T. Merrill**  
Chairman, Recruitment Committee  
Geophysics Program AK-50  
University of Washington  
Seattle, Washington  
Seattle, WA 98195

The University of Washington is an affirmative action opportunity employer.

**Minnesota Pollution Control Academy/Hydrogeologist.** Applications are being accepted for a hydrogeologist position with the Minnesota Pollution Control Agency. The vacant is in the new hydrogeology section of the agency's Paul area. Applicants must have a background in geology, hydrology or engineering with specific coursework and/or experience in ground water hydrology. A Master's degree may be substituted for a portion of the experience rating. Experience in developing ground water models is desired. The position will include limited field work and contact for supervision. For application information please contact:

**Richard Nelson**  
Minnesota Pollution Control Agency  
1915 West County Road B-2  
Roseville, Minnesota 55113  
Telephone: (612) 266-7611

The State of Minnesota is an affirmative action opportunity employer.

The University of Illinois is an Affirmative Action/Equal Opportunity Employer.

**Hydrogeologist/University of Illinois at Urbana-Champaign.** The Department of Geology has initiated its search for a hydrogeologist to fill a permanent, tenure-track faculty position. The appointment will be at the Assistant Professor level.

Applicants must have a background in hydrogeology or engineering with specific coursework and/or experience in ground water hydrology. A Master's degree may be substituted for a portion of the experience rating. Experience in developing ground water models is desired. The position will include limited field work and contact for supervision. For application information please contact:

**Dr. James J. O'Brien**  
NASA Traineeship Program  
Metastore, Annex  
The Florida State University  
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**Dr. Fred N. Spiess**, Director  
Institute of Marine Resources, A-028  
 Scripps Institution of Oceanography  
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**Meetings (cont. from p. 981)**

can be identified with the "active network" outside the normal active-region boundaries on the sun. Because of its broad spatial extent, this component would not have a large modulation by the solar rotation. The need for such a term is fairly obvious from the UV or Heli 10830 time sequences, but it is unknown (and fundamentally important for solar physics) whether or not this component can be physically distinguished from the evolution of active regions, including the ephemeral regions.

A major goal of the workshop was the identification of ground-based observations that could best provide the key solar synoptic data for the interpretation of all these phenomena. In the past, solar synoptic data have enjoyed the glamour of a number of other branches of astronomy, and this has caused suffering both in terms of resources available and, at times, in quality of personnel. There have been many (probably unfair) references to 17th-century techniques for existing synoptic data, but all workshop participants would agree that improvements in type or quality of data are relatively easy to achieve.

**Large-Scale Snow Studies**

A workshop on Large-Scale Snow Studies, sponsored by the IACS International Committee on Snow and Ice (ICS) was held in Hamburg on August 26, 1983 to discuss a 1981 ICS working group report on the subject; present several invited review papers, and obtain recommendations that would be considered for submission to ICS. Albert Rango, U.S. correspondent for ICS, was the workshop convener.

The consensus of opinion at the workshop was that continued research in remote sensing of snowpack properties should be supported; microwave research should point toward definition of the optimum set of sensors for spaceborne studies; and a comparison of the mapping of large-scale snow extent with

operational NOAA visible products and spaceborne microwave radiometers should be conducted.

ICS should promote the idea of increased reporting of snow data to the appropriate World Data Centers (WDC) by member countries. There are few regular contributors of snow data to the centers whereas data on sea ice is reported much more regularly and in far greater quantity. Improved access to conventional snow data is mandatory for successful remote sensing studies. Furthermore, remote sensing data sets should be submitted to the WDC upon completion of analysis so that they will be available to other investigators. It was pointed out that the U.S. Air Force will launch another in their series of DMSP satellites in 2-3 years that will carry a multispectral microwave radiometer directly applicable to snow property mapping. ICS should support the acquisition and archiving of these data so that they can be readily accessible for scientific investigation. This activity must be initiated soon in order to make effective use of the data when the satellite is launched.

The working group will continue to evaluate progress in this area and shall inform ICS on the likelihood of conducting a sym-

**Future AGU Meetings****Fall Meeting**

Dec. 3-7, 1984, San Francisco  
(Abstracts due mid-September 1984)

Dec. 9-13, 1985, San Francisco  
(Abstracts due mid-September 1985)

**Ocean Sciences Meeting**

Feb. 20-24, 1984, New Orleans

**Spring Meetings**

May 14-18, 1984, Cincinnati  
(Abstracts due February 22, 1984)

May 27-31, 1985, Baltimore  
(Abstracts due early March 1985)

**6 SUN Report**

Recognizing the need of SI units in physical seismology, and noting IAPSO Resolution no. 9 adopted in Canberra:

IAPSO welcomes Part Two of the SUN Report, and recommends the adoption of the complete SUN Report in final form and urges the scientific community to study the report and consider its use in scientists, publishers, and editors of oceanographic journals, hopefully by January 1, 1984, filed to National Committees.

**7. Atmospheric and oceanic observations over the Pacific Ocean**

Recognizing that the World Climate Research Program requires atmospheric and oceanic observations over oceans and that initiation of Ocean Station PAPA in the North Pacific in 1981 constitutes a serious loss to the climate record, to atmospheric and ocean research activities, and to operational weather forecasting;

and recognizing that as a result of increasing cost of operation, weather ships cannot be relied on to provide continuous, fixed point observations, and that under Canadian leadership, several North Pacific nations are cooperating in new ship-of-opportunity programs to provide oceanographic, surface meteorological, and upper air observations;

be it resolved that the IAPAP, IAPSO, and IUGG commend the efforts of Canada in undertaking to develop a satisfactory ship-of-opportunity observing system for the eastern North Pacific; recognizing further the increasing importance of studies to oceanographic and meteorological observations over the world's oceans;

be it further resolved that nations operating ocean satellites over ocean areas be urged to take steps to insure the continuity and quality of an oceanographic and oceanographic data.

*Directed to National Committees*

**Hard Work Award**

The first distinguished service award that IAPSO has ever given to a physical oceanographer, entitled the "Hard Work Award" and consisting of an inlaid Indian jewel box, was given to Maurice Menaché, formerly with the Institut Océanographique in Paris, for his 10 years of distinguished and devoted service as Chairman of the IAPSO Working Group in Symbols, Units and Nomenclature in Physical Oceanography. IAPSO Secretary General Eugene C. LaFond notes that Menaché "steadily guided the successful establishment of Symbols International (SI) units in physical oceanography."

**4. Tidal measurements**

Recognizing the need for improved models of the ocean tides, both for their intrinsic importance and their applications to geodetic, satellite, and electromagnetic measurements;

IAPSO recommends that additional tidal and pelagic tidal measurements be made, especially in areas where present models differ or where few measurements have been taken, and also in shelf seas where the tidal dissipation rate needs to be more accurately determined.

*Directed to National Committees*

**5. Oceanographic tables and manual**

Noting the oceanographic tables being produced by the IOC/IAPSO;

and realizing the need for an additional manual consisting of tables, procedures and techniques of physical oceanographic computations, especially for those scientists who do not have suitable computers, and for use in teaching practical oceanographic computations;

IAPSO recommends that UNESCO and SCOR be approached to form a working group together with IAPSO to address this matter.

*Directed to UNESCO and SCOR*

**6. Algorithm for oceanographic computations**

Note the recommendation of the Joint Panel on Oceanographic Tables and Standards

IAPSO adopts for general use by oceanographers the Algorithms for Oceanographic Computations as designed by N. P. Fofouli and R. C. Millard;

and IAPSO urges UNESCO to publish these algorithms as soon as possible.

*Directed to UNESCO*

**7. Oil disaster in the Arabian Gulf**

Noting the continuous discharge of crude oil into the sea from war-destroyed oil wells into the Arabi-

**8. SUN Report**

Recognizing the need of SI units in physical oceanography; and noting IAPSO Resolution no. 9 adopted in Canberra:

IAPSO welcomes Part Two of the SUN Report, and recommends the adoption of the complete SUN Report in final form and urges the scientific community to study the report and consider its use in scientists, publishers, and editors of oceanographic journals, hopefully by January 1, 1984, filed to National Committees.

**9. Atmospheric and oceanic observations over the Pacific Ocean**

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*Directed to National Committees*

**10. Reaffirming the importance of standardizing strong-motion records stressed in resolution 9 of 1981**

Affordably, resolves to sponsor an international workshop to compare and exchange current processing techniques;

7. Noting that the lack of sufficient strong-motion data hampers the understanding of the near-source effects of earthquakes and the behavior of structures, urges efforts to collect such data as is needed.

8. Urges the World Data Center, in collaboration with IAFI and other interested organizations, to encourage and intensify the collection and distribution of strong-motion data.

**International Association of Seismology and Physics of the Earth's Interior****Resolutions**

Reproduced below are resolutions adopted by IASPEI during the 18th General Assembly of the International Union of Geodesy and Geophysics (IUGG) in Hamburg, August 15-19, 1983.

The resolutions passed at each quadrennial general assembly of IUGG and of its member associations are an important barometer of current opinion in the geophysics community and can be a powerful tool in the development of the scientific programs to which they are addressed. The resolutions will help advance programs, however, only if they are used. Carried back home by the national committees which make up the IUGG, the resolutions can spread information worldwide on programs that promise to most effectively advance geophysical knowledge. IUGG and its member associations intend that member groups will present the resolutions before deliberative bodies and otherwise use them to make decision makers aware of international scientific thought.

The 19 resolutions adopted by IUGG as a whole appeared in *Eos*, October 4, 1983, p. 15-27.

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3. Recognizing the need to elucidate and resolve details of lithospheric structure, and noting that recent seismic reflection surveys of a continental kind have disclosed at moderate cost such details in depth of 15 to 50 km beneath continental shelves, urges the international organization of cooperative surveys not only in shelf areas, but also in inland seas and lakes as well as on land. The shelf seas and continental margins of Europe, shield areas, and collision zones such as the Mediterranean and Southeast Asia are examples of suitable places to undertake such studies.

4. Noting that research related to earthquake prediction is moving from the stage of gathering data to that of testing hypotheses, and recognizing that it is important to develop comprehensive methods for formulating and evaluating earthquake predictions, resolves to seek the cooperation of Unesco and other international bodies in organizing an international seminar on "Testing Hypotheses of Earthquake Prediction."

5. Recognizing the value of the work performed by the Standard Earth Model Committee, and noting that further research that refines the work of the Model is necessary, thanks them for their work in creating the Preliminary Reference Earth Model, and resolves to continue its support within the framework of the Commission on Seismological Theory.

6. Reaffirming the importance of standardizing strong-motion records stressed in resolution 9 of 1981

Affordably, resolves to sponsor an international workshop to compare and exchange current processing techniques.

7. Noting that the lack of sufficient strong-motion data hampers the understanding of the near-source effects of earthquakes and the behavior of structures, urges efforts to collect such data as is needed.

8. Urges the World Data Center, in collaboration with IAFI and other interested organizations, to encourage and intensify the collection and distribution of strong-motion data.

9. Noting the importance of a fuller theoretical and observational understanding of the nonlinear behavior of soils subjected to strong earthquakes motion, urges seismologists to install further instruments in boreholes, and three-dimensional arrays, and to carry out such studies.

10. Recognizing the importance of collecting, processing, and publishing high-quality seismological data on a global scale commands the International Seismological Center most highly for its continuing achievements in this field, and expresses its sincere thanks to the director and staff for their substantial contribution to the Association by their support of the IASPEI Secretariat.

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The 19 resolutions adopted by IUGG as a whole appeared in *Eos*, October 4, 1983, p. 52.

The International Association of Seismology and Physics of the Earth's Interior (IASPEI),

1. Recognizing the importance of historical seismicity to the study of seismicity, earthquake risk, and large earthquakes or smaller shocks occurring in regions of infrequent activity or in developing areas where few records are available are concerned, commends the progress of the joint IAP